CHROMOSOME NUMBERS OF FOUR SPECIES OF *DROSERA* (DROSERACEAE)[1]

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ABSTRACT

Chromosome numbers of four species of *Drosera* are newly reported. Chromosome counts for *D. cistiflora* ($2n = 40$), *D. glanduligera* ($2n = 22$), and *D. nitidula* ($2n = 28$) contribute toward a determination of new basic chromosome numbers for sects. *Ptycnostigma* ($x = 10$), *Coelophylla* ($x = 11$), and *Lamprolepis* ($x = 11$), respectively. The count of $2n = 30$ for *D. schizandra* verifies the basic number previously reported for sect. *Arachnopus*.

Chromosome numbers of various *Drosera* taxa have been reviewed and reported by Kondo (1966, 1969, 1970, 1971a, 1971b, 1973, 1976), Kondo & Whitehead (1971), and Kondo, Segawa & Nehira (1976). Since chromosome counts are of great biosystematic importance in *Drosera*, additional reports of chromosome numbers are useful and should contribute to a better understanding of the genus.

MATERIALS AND METHODS

Materials used in this study were collected from the following sources:

Drosera cistiflora L. Ca. 11 km west of the center of Port Elizabeth, Republic of South Africa, south of the road leading to Humansdorp. Voucher specimen: *Olivier 1948*; deposited in the Herbarium, The University of Port Elizabeth (UPE).

Drosera glanduligera Lehm. Western Australia, Australia (collected by W. J. Forrest, Te Puke, New Zealand). Voucher specimen: *Forrest s.n.*; deposited in the Herbarium, Faculty of Integrated Arts and Sciences, Hiroshima University (*Kondo 1805*).

Drosera nitidula Planch. Native to Western Australia, Australia (exact source unknown; cultivated by M. Hirano, Tokyo, Japan). Voucher specimen: *Hirano s.n.*; deposited in the Herbarium, Faculty of Integrated Arts and Sciences, Hiroshima University (*Kondo 1806*).

Drosera schizandra Diels. Native to Queensland, Australia (exact source unknown; cultivated by M. Hirano, Tokyo, Japan). Voucher specimen: *Hirano s.n.*; deposited in the Herbarium, Faculty of Integrated Arts and Sciences, Hiroshima University (*Kondo 1807*).

Somatic chromosomes at midmetaphase were obtained from apical cells of shoots of the above mentioned clones. The shoot apices were treated with 0.002M hydroxyquinoline at 18°C for four hours before they were fixed in Carnoy's solution (95% ethanol:chloroform:glacial acetic acid in a ratio of 2:1:1) at 4°C, following which they were hydrolyzed and stained in a 10:1 mixture of 2% aceto-orcein and 1 N-hydrochloric acid at room temperature (ca. 20°C) for 30 minutes, and then squashed in 2% aceto-orcein.

RESULTS AND DISCUSSION

Drosera cistiflora has a somatic chromosome number of $2n = 40$ (Figs. 1–2). This chromosome number is different from that previously reported by Behre

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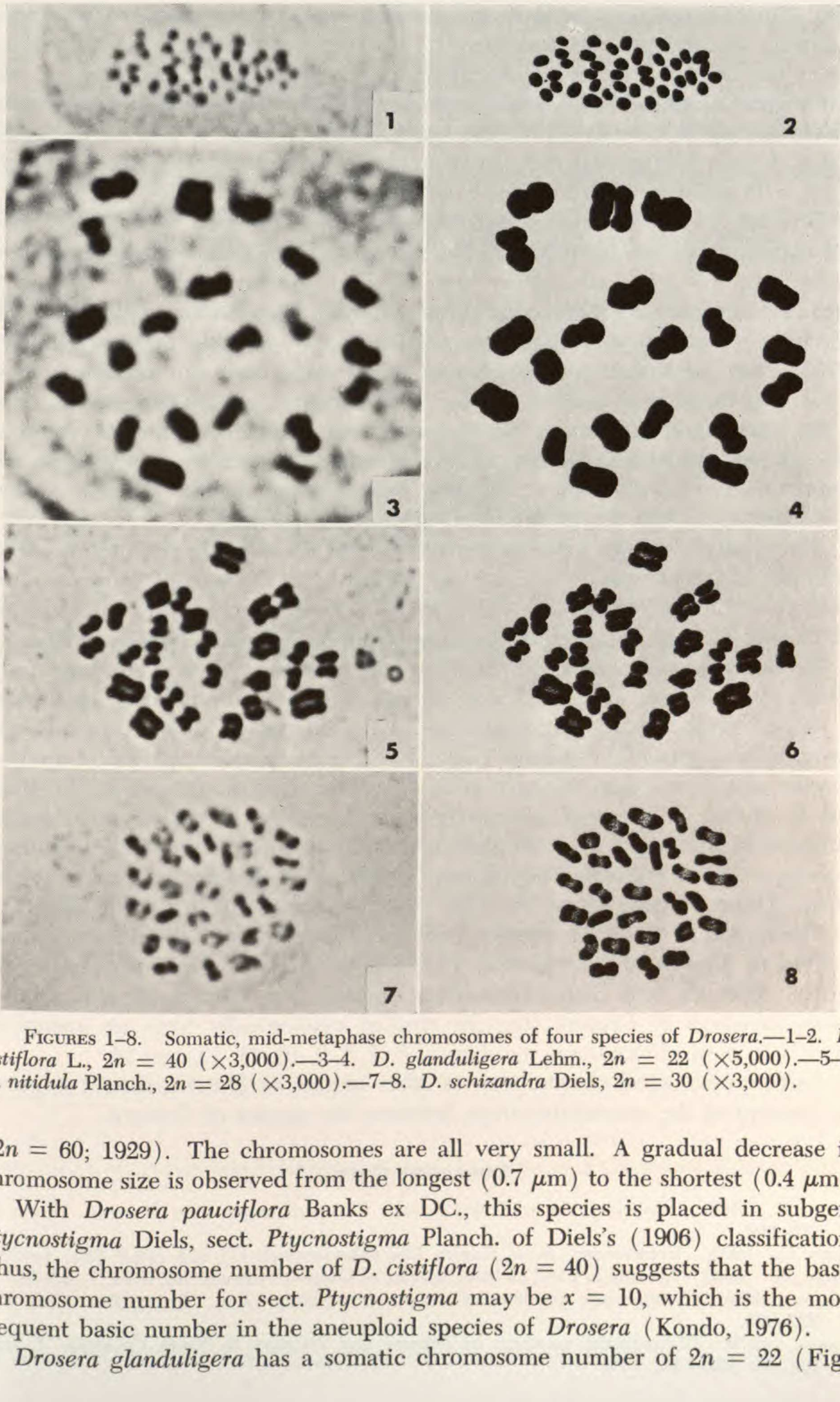

FIGURES 1–8. Somatic, mid-metaphase chromosomes of four species of *Drosera*.—1–2. *D. cistiflora* L., $2n = 40$ (×3,000).—3–4. *D. glanduligera* Lehm., $2n = 22$ (×5,000).—5–6. *D. nitidula* Planch., $2n = 28$ (×3,000).—7–8. *D. schizandra* Diels, $2n = 30$ (×3,000).

($2n = 60$; 1929). The chromosomes are all very small. A gradual decrease in chromosome size is observed from the longest (0.7 μm) to the shortest (0.4 μm).

With *Drosera pauciflora* Banks ex DC., this species is placed in subgen. *Ptycnostigma* Diels, sect. *Ptycnostigma* Planch. of Diels's (1906) classification. Thus, the chromosome number of *D. cistiflora* ($2n = 40$) suggests that the basic chromosome number for sect. *Ptycnostigma* may be $x = 10$, which is the most frequent basic number in the aneuploid species of *Drosera* (Kondo, 1976).

Drosera glanduligera has a somatic chromosome number of $2n = 22$ (Figs.

3–4). The chromosomes are small and similar to each other in shape. The longest (1.3 μm) and shortest chromosomes (1.1 μm) are roughly the same size. Since this is the only species in subgen. *Rorella* DC., sect. *Coelophylla* Planch., the chromosome number of this species indicates that the basic chromosome number for the section is $x = 11$. This basic chromosome number is new in the genus and it in part bridges the gap between two previously known basic numbers, i.e., $x = 10$ and $x = 13$.

Drosera nitidula has a somatic chromosome number of $2n = 28$ (Figs. 5–6). The chromosomes are distributed in two size classes, one with eight large chromosomes (ave. 1.7 μm) and another with 20 short chromosomes (ave. 0.7 μm in size). *Drosera nitidula* is placed in subgen. *Rorella*, sect. *Lamprolepis* Planch., in which the reported basic chromosome number is $x = 9$ (Kondo, Segawa & Nehira, 1976). Thus, the chromosome number $2n = 28$ and the basic chromosome number $x = 7$ or 14 found in *D. nitidula* are new to the section, but are the same as those in the related sect. *Bryastrum* Planch., which has a single species, *D. pygmaea* DC. (Kondo, Segawa & Nehira, 1976). Members of sections *Lamprolepis* and *Bryastrum* have chromosomes exhibiting similar morphological patterns, as well as similarities in leaf morphology and asexual reproduction.

The nonstaining gap between the chromatids of each chromosome is rather wide and the centromeric region is not clearly seen throughout prophase, prometaphase, and midmetaphase. This may be a cause of polycentric chromosomes which lack a single, localized centromere (Kondo, Segawa & Nehira, 1976).

Drosera schizandra has a somatic chromosome number of $2n = 30$ (Figs. 7–8). All the chromosomes are small (ave. 1.1 μm in size) and similar to each other in shape. Midmetaphase chromosomes have well-stained distal segments and poorly stained proximal segments (Figs. 7–8). This species is placed in subgen. *Rorella*, sect. *Arachnopus* Planch. with two other species, *D. adelae* F. Muell. and *D. indica* L. *Drosera schizandra* and *D. adelae* both have the somatic chromosome number of $2n = 30$, although the latter species has another cytotype with $2n = 28$ in a cultivated population (Kondo, 1976; Kondo, Segawa & Nehira, 1976). *Drosera indica* shows $2n = 28$ (Venkatasubban, 1950; Kondo, 1966).

The results of this study provide new data for representative species of those sections of *Drosera* in which basic chromosome numbers were previously unknown. With the new basic chromosome number $x = 11$ from *Drosera glanduligera*, members of *Drosera* thus far studied cytologically form an aneuploid series with basic chromosome numbers of 6, 7, 8, 9, 10, 11, 13, and 14.

Further cytological observations of other species of *Drosera* should improve our concept of the interrelationships between the species of *Drosera*.

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